



## ITCE 315: Computer Networks

Midterm Exam I  
Date: Sun 27.10.2013  
Duration: 60 minutes

SID:

Name:

Section:

**DRAGON**

Question	Mark	Mark Attained
1	7	5.5
2	3	2
3	4	4
4	6	5.5
Total	20	17



Q1. Discuss the main differences of the following in two points: [7 marks]

a. Cable Internet (Hybrid Fiber Coax) and DSL.

1 - Cable Internet provide higher speeds, the speed goes down as more user are using it. shared

- DSL provide speed up to 54 Mbps, and it use the same cable as telephone cable, it uses twisted-pair copper cables.

b. WiFi and Wide-Area Wireless Access Networks.

2 - WiFi has rang up to only tens of meters, while wide-Area  
- wireless Access Networks have rang up to tens of kilometers.

c. TDM and FDM in a circuit-switched network.

2 - TDM give the full bandwidth to single user at a time (there is delay between users)  
- while FDM share the bandwidth with all users. How?

d. Fiber optic cables and twisted-pair cables.

1 - Fiber optic cables sends signals to long distance without disengrater?  
(up to 100 km), and have higher speeds, but it's expensive.  
- twisted-pair cables are the most common used and they are cheaper

e. Wireless network and wired network.

2 - Wireless network allow devices to connect to the network without wires, because the signals are send freely in the atmosphere, and they penetrate walls.  
- wired network guide the signals through solid objects like cables.



f. Packet switched network and circuit switched network.

- packet switched network ~~doesn't~~ reserve the resources, and allow ~~better~~ sharing of the bandwidth

① - circuit switched network require reserving the resources, and it's less efficient than packet switched network.

g. Bandwidth flooding and connection flooding in Internet Denial-of-Service (DoS) attacks.

- Bandwidth Flooding: the attacker sends ~~millions of requests~~ <sup>so many packets</sup> to target in order to make the target unavailable to legitimate users.

① - ~~bandwidth~~ connection flooding: the attacker ~~open~~ <sup>send so many</sup> half or full TCP connections to the target in order to make it unavailable to users. <sup>request</sup>

Q2. A packet switch receives a packet and determines the outbound link to which the packet should be forwarded. When the packet arrives, one other packet is halfway done being transmitted on this outbound link and five other packets are waiting to be transmitted. Packets are transmitted in order of arrival.

a. Suppose all packets are 1,500 bytes and the link rate is 2 Mbps. What is the queuing delay for the packet? [2 marks]

$$\begin{aligned} \text{queuing delay} &= \cancel{\frac{L}{R}} + \left( \frac{5L}{R} + \frac{L}{2R} \right) \\ &= \frac{1500 \times 8}{2000000} + \frac{5 \times 1500 \times 8}{2000000} + \frac{1500 \times 8}{2 \times 2000000} \\ &= \frac{60}{10000} + \frac{5 \times 60}{10000} + \frac{60}{20000} = \cancel{\frac{6}{1000}} + \frac{30}{1000} + \frac{3}{1000} = 39 \text{ msec} \end{aligned}$$

1.5

b. What is the queuing delay when all packets have length  $L$ , the transmission rate is  $R$ ,  $x$  bits of the currently being transmitted packet have been transmitted, and  $n$  packets are already in the queue. [1 marks]

$$\begin{aligned} \text{queuing delay} &= \cancel{\frac{L}{R}} + \left( \frac{nL}{R} + \frac{L-x}{R} \right) \\ &= \frac{(n+2)L - x}{R} \text{ seconds} \end{aligned}$$

1/2



**Q3. [4 marks]**

- a) Assign the following functions to one or more layers of the OSI model: [2 marks]

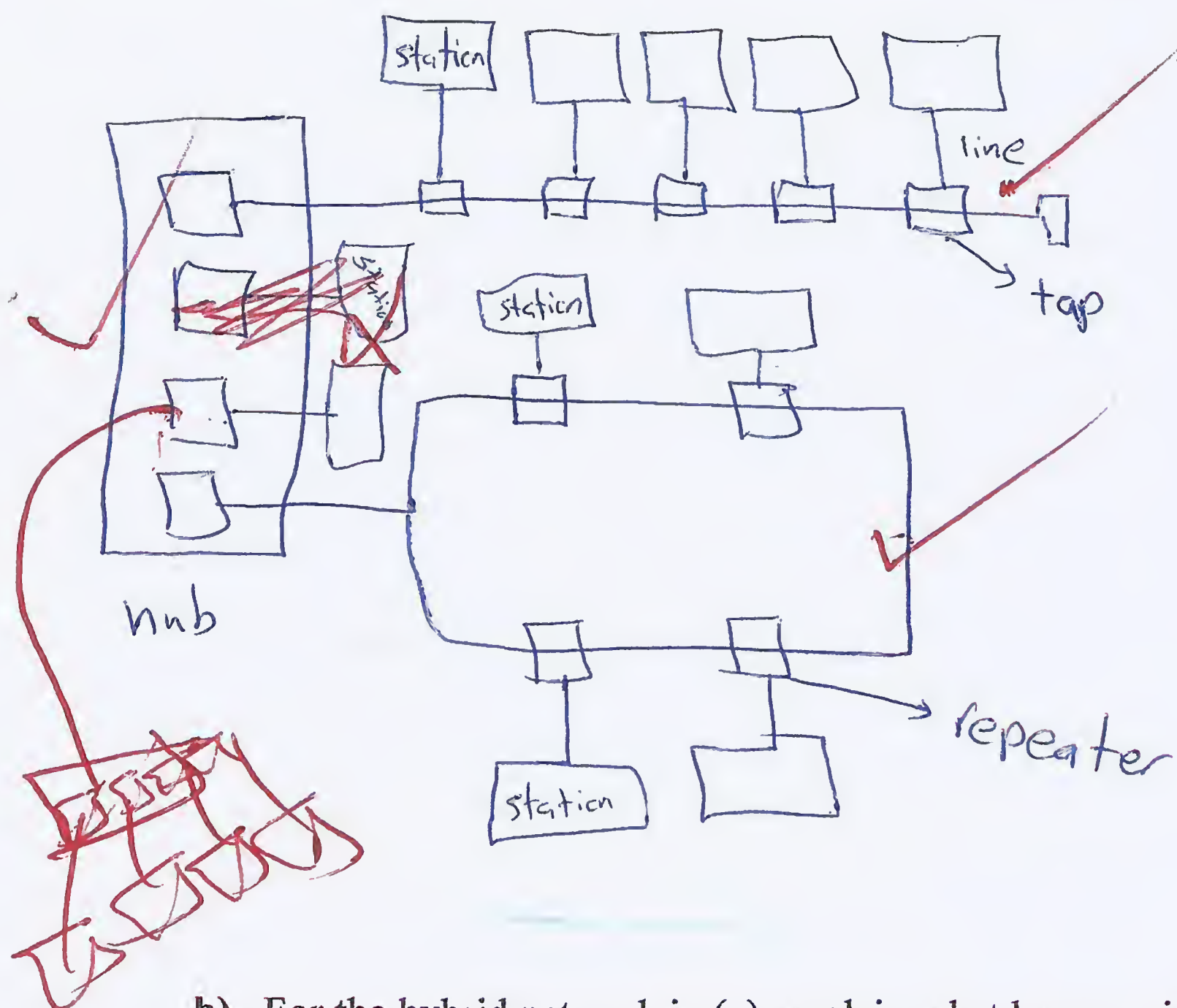
Function	Layer
Synchronization	session
Route selection	network
Compression/decompression of data	presentation
Ensuring reliable transmission of data.	transport

- b) Assign the following protocols to the appropriate layer of the TCP/IP protocol suite: [2 marks]

Protocols	Layer
TCP	transport
HTTP	application
IP Protocol	network
Erthernet	link

**Q4. [6 marks]**

- a) Draw a hybrid topology with a star backbone, one star network with four nodes, one bus network with five nodes and one ring network with four nodes. [2 Marks]



- b) For the hybrid network in (a), explain what happens if: [3 Mark]

1. The hub in the backbone is damaged
  - a) The whole hybrid network will continue to operate
  - ☒ (b) The whole hybrid network will be down
  - c) Only the bus network will be down
  - d) None of the above

2. The main cable in the ring network is damaged
- a) The whole hybrid network will continue to operate
  - b) The whole hybrid network will be down
  - ☒ c) Only the ring network will be down
  - d) None of the above

3. A break in the main cable of the bus networks
- a) The whole hybrid network will be down
  - ☒ b) Only the bus network will be down
  - c) Nothing, all the networks will be operational
  - d) None of the above

- c) Eight devices connected in a mesh topology with full duplex capability. Calculate the total number of cables in the network. [1 Mark]

$$\begin{aligned} \text{total number of cables} &= \frac{n(n-1)}{2} \\ &= \frac{8(7)}{2} = 28 \text{ cable} \end{aligned}$$